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10/700,328	11/03/2003	Ling Chen	005190 CPI/COPPER	5144
44257	7590	09/28/2007	EXAMINER	
PATTERSON & SHERIDAN, LLP			CHEN, KEATH T	
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HOUSTON, TX 77056			1762	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/700,328

Applicant(s)

CHEN ET AL.

Examiner

Keath T. Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) 32-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/29/2004, 06/06/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-23 and 25-31 (if claim 23 is method) or claims 1-31 (if claim 24 is not method), drawn to apparatuses for delivering gases to a process chamber in a controlled manner, classified in class 118, subclass 715.
- II. Claims 24 and 32-41 (if claim 24 is method) else claims 32-41, drawn to a method for monitoring and controlling delivery of a precursor, classified in class 427, subclass 248.1.

Claim 24 recites a method. It is assumed applicant meant claim 24 to be apparatus.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatuses of I could be used to monitor the flow rate of the carrier gas in the process stream as a way to control the flow rate of the system.

Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

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- a. the inventions have acquired a separate status in the art in view of their different classification;
- b. the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- c. the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- d. the prior art applicable to one invention would not likely be applicable to another invention;
- e. the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after

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the election, applicant must indicate which of these claims are readable on the elected invention.

If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. During a telephone conversation with Todd Patterson on 25 July 2007, a provisional election was made with traverse to prosecute the invention of Group I, claims 1-31. Affirmation of this election must be made by applicant in replying to this Office action. Claims 32-41 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

1. Claim 7 is objected to because of the following informalities: "adjustes".

Appropriate correction is required. Claim 7 will be examined as "adjusts".

Claim interpretation

Claim 23, "a signal indicative of a concentration of the precursor ... controller ... is configured to maintain the concentration of the precursor and the volume flow rate of the process gas constant by adjusting the first valve and the second valve" will be interpreted as to maintain the concentration of the signal indicative of the precursor, possibly variable concentration or zero concentration.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 4, 7, 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites the limitation "the temperature" in line 2. There is insufficient antecedent basis for this limitation in the claim. It is assumed hereafter that "a temperature" for claim 4.

For claims 7 and 18, it is not clear whether the flow refers to the flow of what? (The flow of second carrier gas or the flow of the process gas). It is assumed hereafter that said "constant flow" is the process gas.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. Claims 1, 3-11, 13-23, and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iseki et al. (US 6174371, hereafter '371), further in view of Ono (US 5372754, hereafter '754).

'371 teaches the limitations of:

Claim 1: An apparatus (Fig. 2) for controlling delivery of a precursor from a vessel (#10, vaporizer) to a process chamber (#50), comprising: a first carrier gas (the lower N₂) flowing into the vessel, whereby the first carrier gas is combined with the precursor (treating liquid, col. 7, lines 45-46); an output from the vessel in fluid communication with the process chamber; a second valve (#39) adapted to regulate a second carrier gas (the upper N₂) flowing to the process chamber (through mixer #38)

whereby the first and second carrier gases and the precursor are combined to form a process gas, and a controller (#72).

Claim 11: A system comprising: a process chamber (#50); a gas delivery system (#30) adapted to deliver a precursor from a vessel (#10) containing the precursor to the process chamber via a process gas produced by flowing a first carrier gas (the lower N₂) into the vessel and combining the first carrier gas with a second carrier gas (the upper N₂) flowing through a bypass around the vessel (as shown in Fig. 2); and an integral controller (controller #72 is capable of integrate signals, col. 10, lines 11-15).

Claim 23: An apparatus for delivering of a precursor from a vessel (#10) to a process chamber (#50), comprising: a first carrier gas (the lower N₂) flowing through an input (#13) into the vessel; an output (#14) from the vessel in fluid communication with the process chamber; a second valve (#39) to regulate a second carrier gas (the upper N₂) flowing to the process chamber; a process gas comprising the first carrier gas, the second carrier gas and the precursor; and a controller (#72).

Claim 13: A second valve (#39) controls the second carrier gas.

Claims 3 and 5: The controller is configured to adjust the second valve (#39 is connected to controller #72).

Claims 14 and 16: The integral controller is configured to adjust the second valve.

Claim 4: The controller is configured to adjust a (the) temperature of the vessel to change the concentration of the precursor in the process gas (heater #12 connected to main controller #12, col. 8, line 65 to col. 9, line 5).

Claim 15: The integral controller is configured to increase a temperature of the vessel to increase the concentration of the precursor in the process gas.

Claim 25: The controller is configured to increase a temperature of the vessel to increase the concentration of the precursor in the process gas.

Claims 7 and 27: The second valve adjusts to maintain a constant flow (the apparatus is capable of).

Claim 18: The second valve is adjusted to maintain a constant flow.

Claims 8, 19, and 28: "The first carrier gas and the second carrier gas are the same" (N_2 , moreover, this is intended use).

Claims 9, 21 and 30: "The first carrier gas and the second carrier gas are nitrogen." (Moreover, this is intended use).

Claim 10, 22, and 31: Applicant is claiming an intended use of the parent apparatus claim. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

'371 further teaches the main controller #72 controls the partial pressure of treating liquid through adjusting flow control valve #39 (col. 9, lines 9-13), which requires a partial pressure sensor. The lower N_2 feed intrinsically needs a valve to regulate N_2 supply. '371 further teaches the partial pressure of the vapor of treating liquid may be adjusted by the treating liquid supply (col. 14, lines 58-65), in addition to the adjustment of diluting gas (using valve #39).

'371 does not explicitly teach the other limitations of:

Claim 1: A first valve adapted to regulate the first carrier gas, a gas analyzer having an ultrasonic transducer or a mass flow meter adapted to generate a signal indicative of a concentration of the precursor in the process gas; and a controller configured to calculate a mass flow rate of the precursor based on the signal.

Claim 11: A precursor monitoring apparatus disposed between the process chamber and the vessel, wherein the precursor monitoring apparatus has a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or the signal is indicative of the flow rate of the precursor; and an integral controller to receive the signal.

Claim 23: A first valve to regulate a first carrier gas, a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or indicative of a process flow rate; and a controller to receive the signal and is configured to maintain the concentration of the precursor and the volume flow rate of the process gas constant by adjusting the first valve and the second valve.

Claim 13: A first valve controls the first carrier gas.

Claims 3 and 5: The controller is configured to adjust (both) the first valve and the second valve while maintaining the process gas with a constant flow.

Claims 14 and 16: The integral controller is configured to adjust (both) the first valve and the second valve while maintaining the process gas with a constant flow.

Claims 6 and 26: The first valve adjusts to increase or decrease the concentration of the precursor in the process gas.

Claim 17: The first valve is adjusted to increase or decrease the concentration of the precursor in the process gas.

Claim 20: The gas analyzer is selected from the group consisting of ultrasonic transducers, infrared spectroscopy, ultraviolet spectroscopy, gas chromatography, mass spectroscopy, mass flow meters and combinations thereof.

Claim 29: a gas analyzer is selected from the group consisting of ultrasonic transducers, infrared spectroscopy, ultraviolet spectroscopy, gas chromatography, mass spectroscopy, mass flow meter and combinations thereof.

'754 is an analogous art in the field of liquid vaporizer (abstract), particularly in an extremely high accuracy of mass flow with adjustability (col. 2, lines 23-27), which meets the need of '371 for adjusting partial pressure of the vapor of treating liquid (abstract, last sentence). '754 provides a valve (Fig. 1, #5a, col. 4, lines 34-35 or Fig. 8, MFC, col. 1, lines 42-43) for the carrier gas to the liquid source. '754 further provides a gas analyzer (Fig. 1, LC contains sensor, col. 4, lines 48-49 or Fig. 8, MFM, col. 1, line 44) which calculates a mass flow rate of the precursor based on the sensor signal (col. 4, lines 54-55 or col. 1, lines 51-66) and the control of the valve that supplies carrier gas (Fig. 8).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the valve for the carrier gas to the treating liquid, and the mass flow meter or the LC as taught in '754 to the apparatus of Fig. 2 of '371.

Motivation would have been to adjust the treating liquid (in addition to the adjustment of the diluting gas) to a specific liquid vapor partial pressure profile, as taught by '371 (col. 14, lines 58-65), with a reasonable expectation of success. This combination would have the capability of providing constant flow rate of process gas at specific concentration or partially pressure profile.

4. Claims 2, 12, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over '371 and '754, further in view of Renken et al. (US 4685331, hereafter '331).

'371 and '754, together, teach all limitations of claims 1, 11, and 23. '371 further teaches the system is pulsed (col. 10, lines 11-15).

'371 and '754, together, do not teach the limitation of:

Claim 2: The controller is configured to adjust both the first valve and the second valve while the precursor is pulsed into the process chamber at a period of time in a range from about 0.01 second to about 5 seconds.

Claim 12: The integral controller is configured to adjust both the process gas to be pulsed into the process chamber at a period of time in a range from about 0.01 second to about 5 seconds.

Claim 24: The precursor is pulsed into the process chamber at a period of time in a range from about 0.01 second to about 5 seconds.

'331 is an analogous art in the field of mass flow meter for liquid or gas (field of the invention), particularly in highly accurate flow measurement (col. 2, lines 12-15), which meets the need of '371 for adjusting partial pressure of the vapor of treating liquid

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(abstract, last sentence). '331 provides a sensor/valve assembly with response time less than 0.06 seconds (Fig. 1, col. 3, lines 20-23).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the sensor/valve assembly as taught in '331 to the apparatus of Fig. 2 of '371.

Motivation would have been to accurately adjust the treating liquid and the adjustment of the diluting gas to a specific liquid vapor partial pressure profile, as taught by '371 (Fig. 3, col. 9, lines 8-23 and col. 14, lines 58-65), with a reasonable expectation of success. The above combination would have the capability of pulsing from 0.06 seconds rate and up.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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5. Claims 1-31 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-14 and 24-35 of U.S. Patent No. 6772072 in view of '371.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KC

K.C.

Handwritten signature
9/26/07